



CLEARBROOKE TECHNOLOGIES

Blending Science and Nature

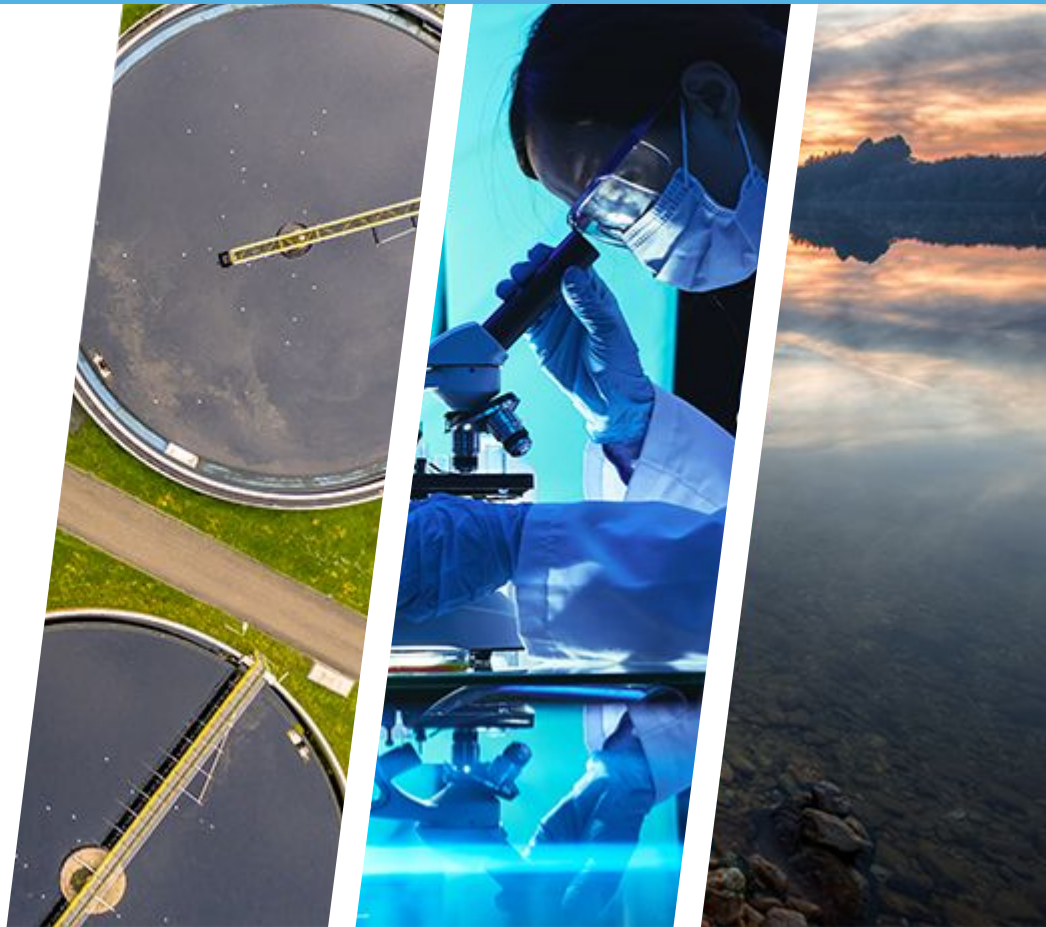


Who is Clearbrooke Technologies?

We are the original developers of ground-breaking cleaning and treatment technology that is safe, effective, and environmentally friendly.

Formerly known by our DBA, **NuSystems LLC**, we've updated our brand to reflect our commitment to **clean water** and a healthy environment by blending science and nature.

Located in Freeland, Michigan we've been serving customers throughout the Midwest for over a decade.





Our Industries

CLEAR  WATER

Wastewater pretreatment programs and odor solutions

CLEAR  WAY

Specialty Halal cleaning products

CLEAR  WELL

Safe and environmentally beneficial household cleaning products

CLEAR  WASH






GMP industrial cleaning services

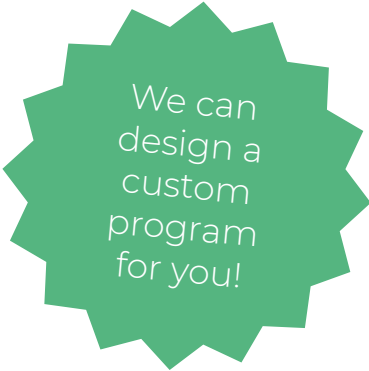


CLEAR WATER

Wastewater System Solutions that Work

Clearbrooke Technologies' customizable CLEAR WATER programs:

-  Eliminate odors caused by anaerobic bacteria and H₂S
-  Improve reporting measurables
-  Enhance suspended solid and FOG breakdown to provide more treatable waste downstream
-  Reduce wastewater lagoon sludge levels
-  Promote healthy lagoon systems



We can
design a
custom
program
for you!



Beneficial Biochemical Changes

Treatment programs begin with a jump-starting spike of **Odor-Out 2000** followed by a continual feed of our chemistry.

Every program is optimized for best feed rate, point of entry, and target issue.

Measurables:

- + Increased dissolved oxygen
- + Increased oxidation/reduction potential
- + Increased pH
- + Decreased turbidity
- + Lowered sludge blanket





Long Term Program Benefits

0-6 Months

- + Reduced odor
- + Reduced electric aerator costs
- + Reduced chemical addition
- + Higher dissolved oxygen

6 Months - 2 Years

- + Reduced sludge layer
- + Reduced greenhouse gas emissions
- + Steady improvement in effluent quality
- + Increased water clarity



Cost Savings

Treating wastewater is not free and it's definitely not cheap! Upkeep costs for wastewater lagoons, treatment plants, and sewer systems in general can include:

- + Electricity
- + Chemicals
- + Sludge Removal
- + Odor Complaints
- + Maintaining Regulatory Compliance
- + Infrastructure Maintenance





Cost Savings: **Electricity**

PROBLEM: When a wastewater lagoon cannot naturally generate enough dissolved oxygen, aerators are needed to raise the levels and prevent it from going septic.

These aerators often require electricity to operate.

The CLEAR WATER Solution:

Continual use of **Clearbrooke Technologies'** pretreatment program will naturally raise DO levels. Clients report being able to turn off most or all of their aerators.





Cost Savings: Chemicals

PROBLEM: To meet discharge requirements, chemicals like polymers, alum, and ferric chloride are used.

This is not only costly but can also be dangerous depending on the chemical.

The CLEAR WATER Solution:

Our technology empowers native bacteria to consume larger amounts and more types of nutrients.

This reduces the need for treatment chemicals such as ferric chloride, saving thousands of dollars.





Cost Savings: **Sludge Removal**

PROBLEM: In a typical wastewater lagoon, a bottom layer of sludge will build up from nutrients and solids settling to the bottom.

Eventually, this buildup must be removed, costing millions of dollars.

The CLEAR WATER Solution:

Over time, the **Clearbrooke Technologies** pretreatment program can shrink the sludge layer by helping the lagoon's native bacteria to consume more types of nutrients in less time.

This can increase the time between sludge removal or eliminating removal altogether!





Cost Savings: Odor Complaints

PROBLEM: Residences located near overly smelly lagoons or other wastewater infrastructure can raise complaints, especially during spring turnover or heat waves.

This can lead to citations and even legal action if there is no improvement.

The CLEAR WATER Solution:

Our pretreatment program can reduce odor levels at times where odor would normally peak.

We also are experienced in odor solutions for lift stations and sewer systems.





Cost Savings: Regulatory Compliance

PROBLEM: Every wastewater lagoon must meet certain criteria in order to discharge the treated water back into the environment. Failure can lead to fines, citations, and more.

The CLEAR WATER Solution:

The **Clearbrooke Technologies** program can improve lagoon efficiency. This results in better levels of DO, TSS, BOD, and more.





Cost Savings: Infrastructure

PROBLEM: Corrosion of pipes and lift stations caused by dangerous H₂S gas.

Fats, oils, and grease build up over time, causing blockages and backups.

The CLEAR WATER Solution:

We offer an H₂S and odor program that can greatly reduce H₂S levels.

Our technology breaks down FOG's, preventing them from reappearing further down the system.





CLEARBROOKE
TECHNOLOGIES

Case Studies



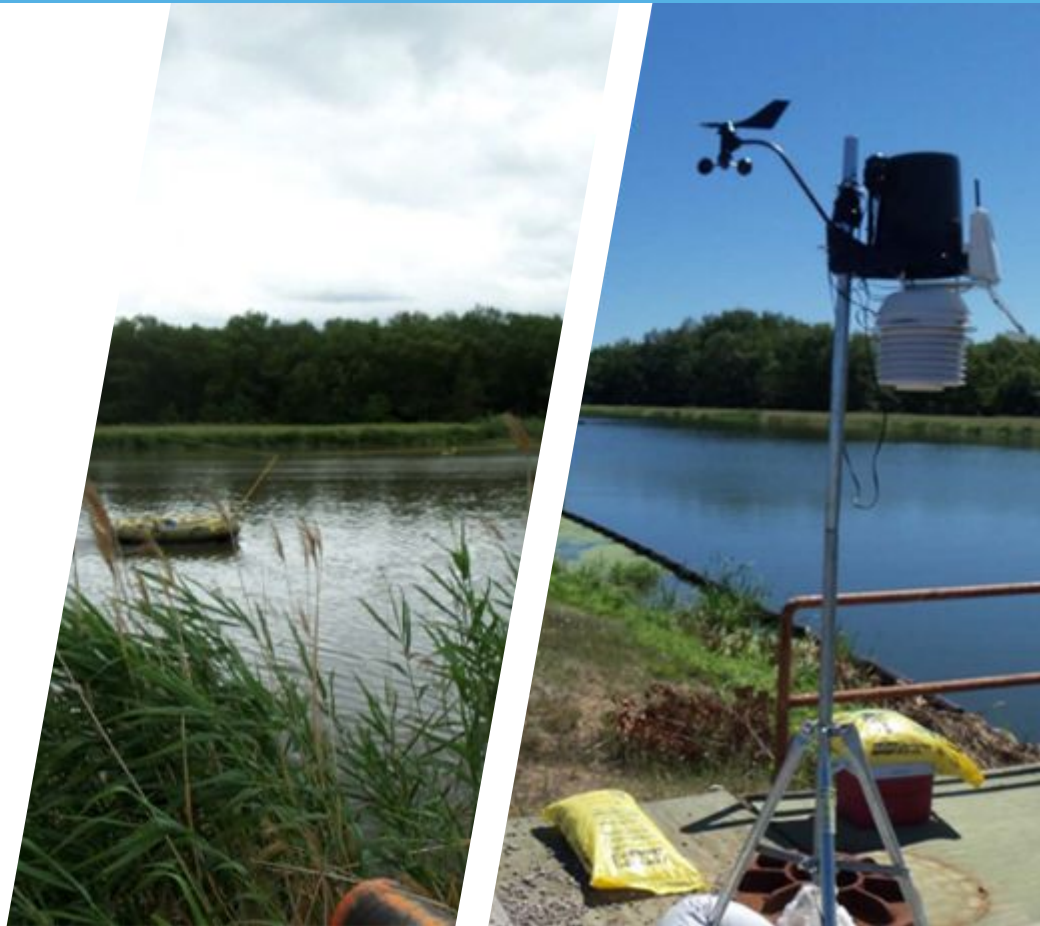
Wastewater Lagoon Case Study

We collected surface and subsurface water quality data before and after treatment.

Variables like rain, sunlight, temperature, volume flow rate changes, and fluctuations in organic load were recorded.

Custom equipment was used to record DO, ORP, TSS, pH, conductivity, and chlorophyll content.

The data showed the difference in performance of untreated vs **Clearbrooke Technologies** treated lagoons in the case studies.





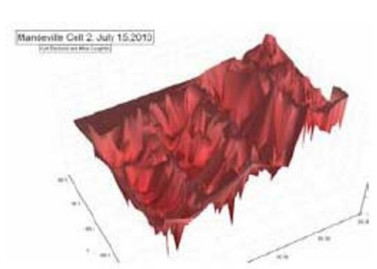
Case Study: Equipment and Methods



Unmanned Research Vessel



Laboratory Pod Cloning



Sludge Mapping

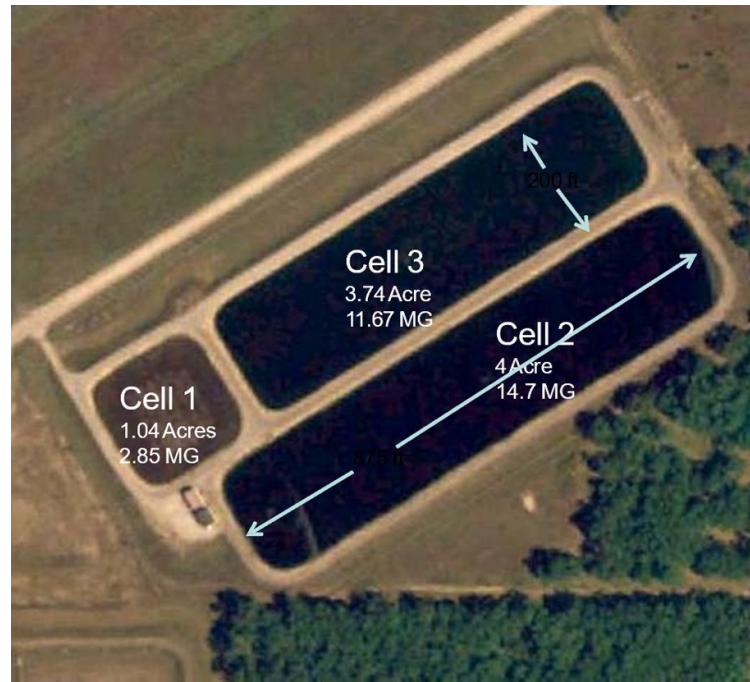


Sensor Monitoring and Data Logging



Location Before Treatment

- + .2 MGD influent
- + Cell 1 heavily aerated
- + Cell 2 treated with 40 lbs alum per day
- + Two solar mixers in Cell 2
- + Regulatory pressure on N and P levels





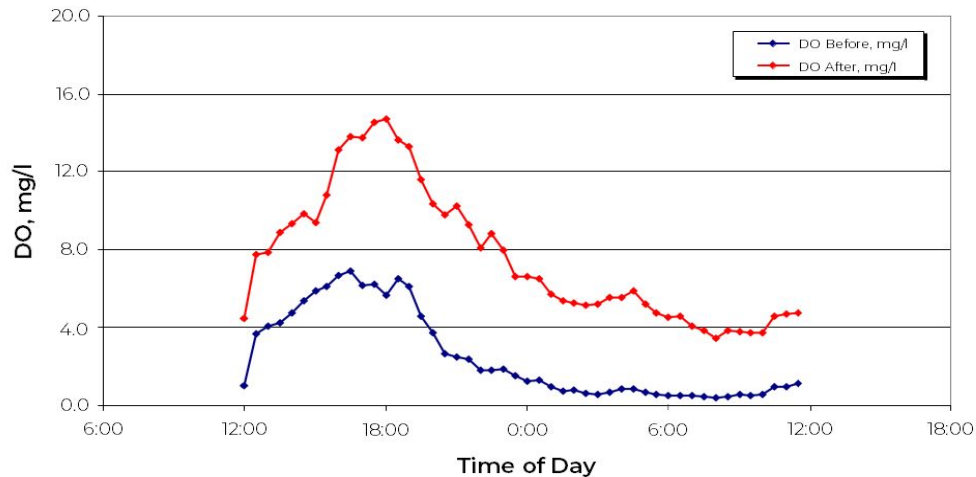
Results: Higher Average Dissolved Oxygen

Cell Two Influent

Dissolved Oxygen Before and After a 5 mg/l Odor Out Spike Dose on 9/1/11

Before Line is the average of all August data

After Line is the average of all September data





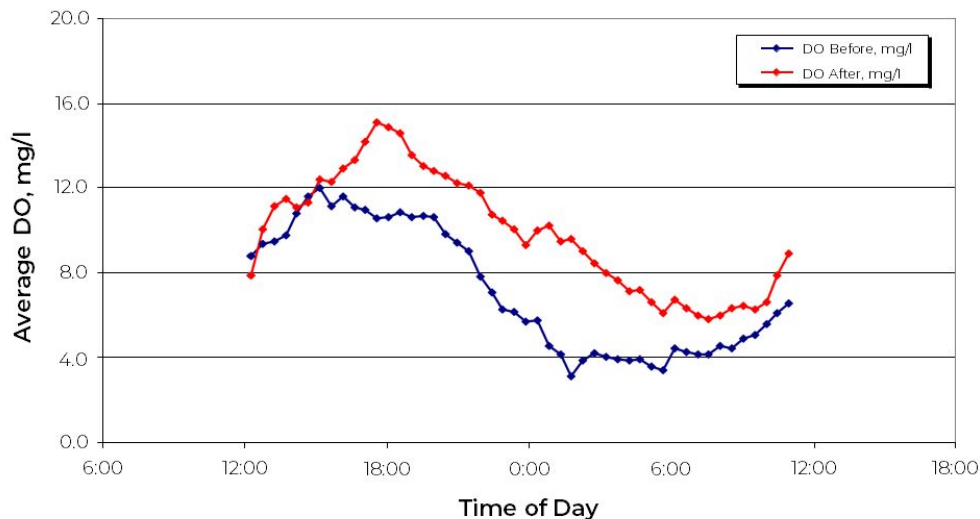
Results: Higher Average Dissolved Oxygen

Cell Two Influent

Dissolved Oxygen at One Foot Before and After a 5 mg/l Odor Out Spike Dose on 9/1/11

Before Line is the average of all August data

After Line is the average of all September data





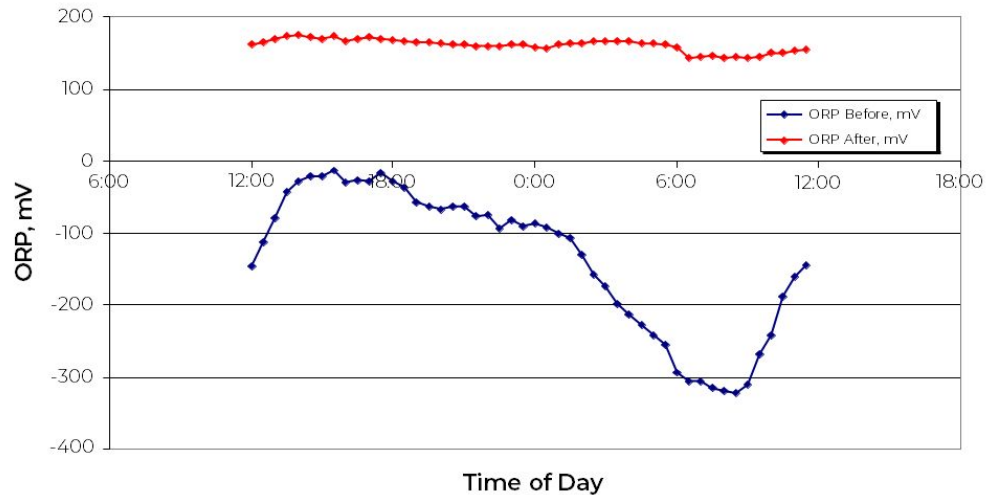
Results: Better ORP

Cell Two Effluent

Oxidation Reduction Potential Before and After 5 mg/l Odor Out Spike Dose on 9/1/11

Before Line is the average of all August data

After Line is the average of all September data





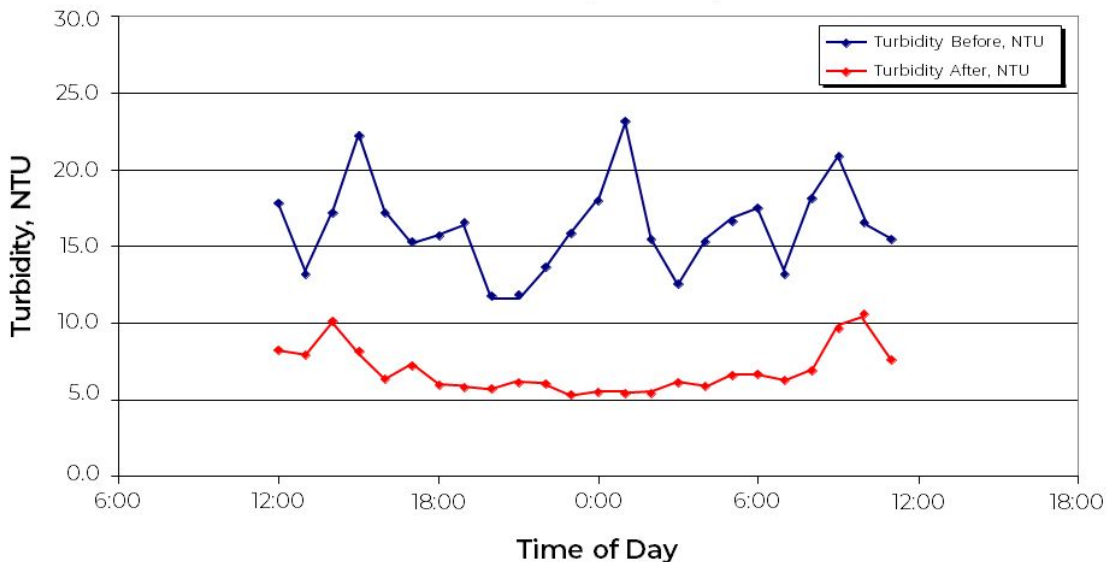
Results: Lower, Stable Turbidity

Cell Two Effluent

Turbidity at One Foot Before and After a 5 mg/l Odor Out Spike Dose 9/1/11

Before Line is the average of all August data

After Line is the average of all September data



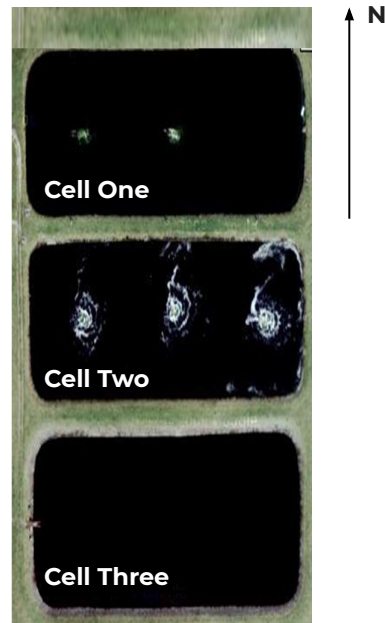


Results: Lower Electric Bill

Monthly Power
Cost with 6
Aerators \$2,166

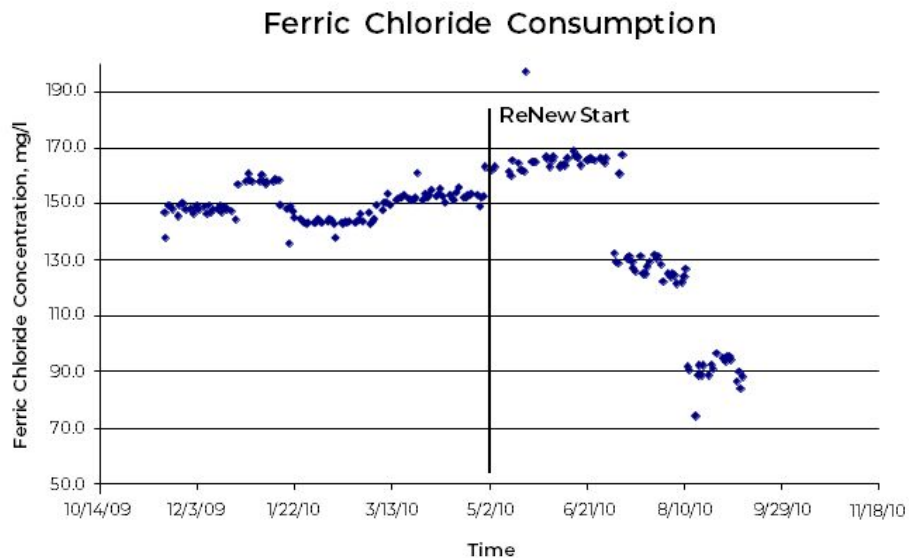
Monthly Power
Cost with 1
Aerator \$436

Annual Savings \$20,800





Results: Reduced Ferric Chloride Use



Before Program:

158 mg/l \$30,000/yr

After Program:

91 mg/l \$17,000/yr

Savings: \$13,000/yr



More Results

Several key issues were improved upon when our technology was used in this lagoon:

- +** **Sludge:** Sludge removal cost for cells 1 & 2 was \$300,000.00+. Our lagoon program reduced sludge levels by 25% in year 1. This saved \$75,000.00 in removal costs.
- +** **H₂S/Odor:** The lagoon averaged six odor complaints per year. Between 2011 and 2012 there were 0 complaints.
- +** **Aeration costs:** Two aerators were in use with a cost of \$1,500.00 per month, plus man hours for maintenance and repair. Three months into our lagoon program, DO numbers increased and the aerators were retired.

<u>Parameters</u>	<u>2009</u>	<u>2012</u>
BOD	50.00	11.00
TSS	70.00	26.00
DO	7.90	14.00
Amm	2.18	1.00
Phos	3.84	1.23



More Results

Another wastewater lagoon that improved thanks to the **Clearbrooke Technologies** program:

- +** **Sludge:** Sludge removal cost was 25% greater than average due to high metal content in the sludge. The sludge blanket has seen 10% reduction annually since 2009 with the Clearbrooke Technologies wastewater pretreatment program.
- +** **Odor Control:** Before our program, the customer was experiencing extensive odor issues from Cell 1 and the main lift station in town. After a week of use, all odors vanished and there was no odor from spring turn-over.

<u>Parameters</u>	<u>Before</u>	<u>After</u>
BOD	2.40	2.30
TSS	9.25	12.40
DO	6.70	.69
Amm	4.90	1.54
Phos	76.00	10.00



Blending Science and Nature

Data proven treatments can be hard to come by. At **Clearbrooke Technologies**, we commit to collecting data for every customer yearly and stand by our work.

Like water, we strive for transparency. Every customer receives bi-annual progress reports and access to an experienced professional for questions.

Each wastewater treatment system a unique individual, so we continually assess program effectiveness based on feedback and measurements.

